

CLAIMS

What is claimed is:

1. A waveguide duplexing and filtering device, comprising:

an enclosure having a longitudinal axis;

a common channel formed in said enclosure and terminating at a common port, and said common channel and said common port adapted to receive a microwave signal having at least two substantially different frequencies including an upper frequency and a lower frequency wherein said lower frequency includes two polarities;

a side channel formed in said enclosure and terminating at a side port, and said side channel in communication with said common channel, and said side channel adapted to cut off said lower frequency of said microwave signal and allow said upper frequency of said microwave signal to propagate through said side channel to said side port;

a main channel formed in said enclosure, terminating at a main port, and communicating with said common channel; and

at least one waveguide iris element mounted within said main channel and adapted to filter said upper frequency of said microwave signal and allow said two polarities of said lower frequency of said microwave signal to pass through said iris element and propagate along said main channel to said main port.

2. The waveguide duplexing and filtering device stated in claim 1, further comprising:

a feed horn coupled to said common port and adapted to direct said microwave signal into said common port.

3. The waveguide diplexing and filtering device stated in claim 1, further comprising:
said lower frequency of said microwave signal having a substantially 12 GHZ signal ranging from 10.7 to 12.75 GHZ.
4. The waveguide diplexing and filtering device stated in claim 1, further comprising:
said upper frequency of said microwave signal having a substantially 20 GHZ signal ranging from 19.7 to 20.2 GHZ.
5. The waveguide diplexing and filtering device stated in claim 1, further comprising:
said main channel having a substantially square cross section.
6. The waveguide diplexing and filtering device stated in claim 1, further comprising:
said common channel and said main channel having a longitudinal axis coaxial with said longitudinal axis of said enclosure; and
said side channel having a longitudinal axis extending at an angle relative to said longitudinal axis of said enclosure.
7. The waveguide diplexing and filtering device stated in claim 1, further comprising:
said waveguide iris element having a substantially horizontal slot and a substantially vertical slot substantially perpendicular to one another.

8. The waveguide diplexing and filtering device stated in claim 1, further comprising:
- said side port and said main port communicatable with a low noise block (LNB) converter.
9. A waveguide diplexing and filtering device, comprising:
- an enclosure having a longitudinal axis;
 - a common channel formed within said enclosure and terminating at a common port, and said common channel having a longitudinal axis coaxially aligned with said longitudinal axis of said enclosure, and said common port adapted to receive a microwave signal having a lower frequency and an upper frequency wherein said lower frequency has two polarities;
 - a side channel formed within said enclosure and terminating at a side port, and said side channel having a longitudinal axis that extends at an angle with respect to said longitudinal axis of said enclosure;
 - said side channel in communication with said common channel and adapted to cut off said lower frequency of said microwave signal and allow said upper frequency of said microwave signal to propagate along said side channel to said side port;
 - a main channel formed in said enclosure and terminating at a main port, and said main channel having a longitudinal axis coaxial with said longitudinal axis of said enclosure, and said main channel in communication with said common channel;
 - and
 - at least one waveguide iris element mounted within said main channel, and said at least one iris element having a pair of slots extending therethrough wherein

said slots are substantially perpendicular to one another and adapted to filter said upper frequency of said microwave signal and allow said two polarities of said lower frequency to pass through said at least one waveguide iris element and propagate along said main channel to said main port.

10. The waveguide diplexing and filtering device stated in claim 9, further comprising:

a feed horn coupled to said common port and adapted to direct said microwave signal into said common port, and said feed horn having a longitudinal axis coaxially aligned with said longitudinal axis of said enclosure.

11. The waveguide diplexing and filtering device stated in claim 9, further comprising:

said lower frequency of said microwave signal having a substantially 12 GHZ signal ranging from 10.7 to 12.75 GHZ.

12. The waveguide filtering device stated in claim 9, further comprising:

said upper frequency of said microwave signal having a substantially 20 GHZ signal ranging from 19.7 to 20.2 GHZ.

13. The waveguide filtering device stated in claim 9, further comprising:

said two polarities of said lower frequency of said microwave signal having linear polarities wherein said polarities are vertical and horizontal.

14. The waveguide diplexing and filtering device stated in claim 9, further comprising:

said side channel lying in the H (magnetic) plane.

15. The waveguide diplexing and filtering device stated in claim 9, further comprising:

said side channel lying in the E (electrical) plane.

16. The waveguide diplexing and filtering device stated in claim 9, further comprising:

said side channel having a substantially rectangular cross section for receiving a single polarity of said upper frequency of said microwave signal.

17. The waveguide diplexing and filtering device stated in claim 9, further comprising:

said side channel having a substantially square cross section adapted to receive two polarities of said upper frequency of said microwave signal.

18. The waveguide diplexing and filtering device stated in claim 9, further comprising:

said side channel having a substantially circular cross section adapted to receive two polarities of said upper frequency of said microwave signal.

19. The waveguide diplexing and filtering device stated in claim 9, further comprising:

said main channel having a substantially square cross section.

20. The waveguide diplexing and filtering device stated in claim 9, further comprising:

said common channel and said main channel having a longitudinal axis coaxial with said longitudinal axis of said enclosure; and

said side channel having a longitudinal axis extending at an angle relative to said longitudinal axis of said enclosure.

21. The waveguide diplexing and filtering device stated in claim 20, further comprising:

said angle between said longitudinal axis of said side channel and said longitudinal axis of said enclosure being substantially 90 degrees.

22. The waveguide diplexing and filtering device stated in claim 9, further comprising:

said waveguide iris element having a substantially horizontal slot and a substantially vertical slot extending therethrough, and said horizontal slot and said vertical slot being substantially perpendicular to one another.

23. The waveguide diplexing and filtering device stated in claim 22, further

comprising:

said horizontal slot and said vertical slot of said waveguide iris element each having a rectangular mid-portion and two arcuate end portions.

24. The waveguide diplexing and filtering device stated in claim 9, further comprising:

said side port and said main port each communicatable with a low noise block (LNB) converter for converting said upper and lower frequency of said microwave signal to a lower frequency.

25. A method for waveguide diplexing and filtering, comprising the steps of:
providing an enclosure having a common channel terminating at a common port;

receiving a microwave signal in said common port and said common channel wherein said microwave signal has at least two substantially different frequencies comprising an upper frequency and a lower frequency wherein at least said lower frequency has two polarities;

filtering said microwave signal through at least one waveguide iris element mounted within a main channel of said enclosure wherein said main channel is in communication with said common channel, and said waveguide iris element having a pair of slots extending therethrough and substantially perpendicular to one another, and said slots dimensionally designed to allow both polarities of said lower frequency of said microwave signal to propagate through said waveguide iris element along said

main channel to a main port wherein said main channel terminates; and
diplexing said microwave signal through a side channel formed in said enclosure wherein said side channel communicates with said common channel and wherein said side channel is dimensionally designed to create a waveguide cutoff by allowing said upper frequency of said microwave signal to propagate through and along said side channel to a side port where said side channel terminates.

26. The method stated in claim 25, further comprising the steps of:

collecting and directing said microwave signal through a feed horn and into said common port.

27. The method stated in claim 25, further comprising the steps of:

providing said microwave signal with said lower frequency of substantially 12 GHZ and said upper frequency of substantially 20 GHZ.

28. The method stated in claim 25, further comprising:

converting said upper and lower frequency microwave signals from said side port and said main port into lower frequency microwave signals.